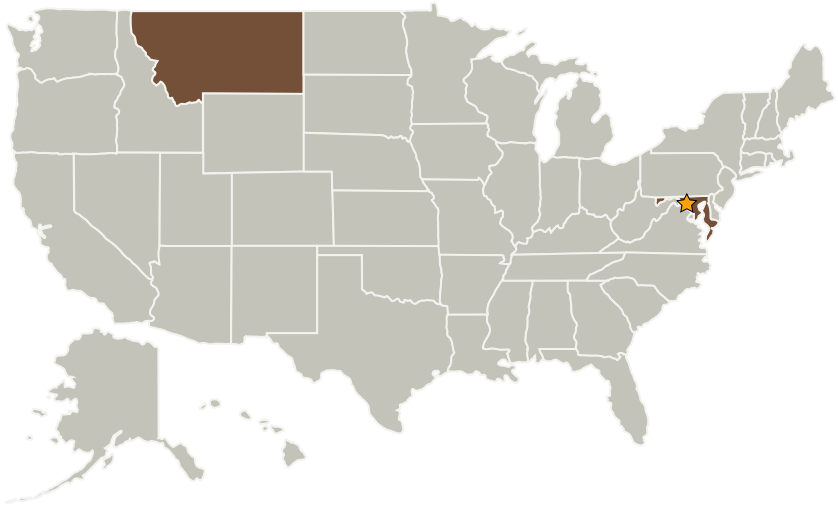
High Power Electro-Optic Modulator for Space-Based Applications, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

This Small Business Innovation Research Phase I effort will establish the feasibility of developing a fiber coupled, high power, electro-optically controlled, space qualified, phase modulator for the NASA Laser Interferometer Space Antenna (LISA). Specific to the LISA project is the use of three spacecraft, spanned by vast distances, to make gravitational wave measurements. A central aspect in maintaining system performance is inter-spacecraft communications which require the use of frequency modulated, high power 1.06 mm light. AdvR's proposed approach offers phase modulation of a high power continuous wave 1.06mm laser signal with modulation capability of 1.9 to 2.1 GHz and 10% modulation depth. The key innovation is the use of a waveguide embedded in a non-linear optical material suitable for high optical power handling combined with patented micro-electrode technology for high speed modulation. To operate properly in space, the phase modulators used for LISA must be rugged to survive the journey to space and must perform optimally in a radiation environment. To achieve this goal, the proposed phase modulator development will include a fiber-in-fiber-out design that meets the space qualification requirements for mechanical stability of the package and radiation damage resistance of the non-linear optical material.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
ADVR, Inc.	Supporting Organization	Industry	Bozeman, Montana

Primary U.S. Work Locations	
Maryland	Montana

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.7 Innovative Signal Modulations